Dredge Sediment Dispersal Study, Brunswick, Georgia, USA

ETS Field Report

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Preamble

This report details the ETS field operations during January-February, 2003, associated with the Dredge Sediment Dispersal Study, Brunswick, Georgia, USA. Operations include deployment of the Hydrocamel™ water sampler, release of sediment tracer material into the sea at two deployment sites, and post-release sampling surveys. The report is presented in chronological order. Note that grab sampling surveys following tracer release are referred to in the following way:

1) T_O – immediate post-deployment sampling within 1-2 days of release
2) T_1 –1st major sediment grabbing survey after T_O
3) T_2 – 2nd major sediment grabbing surveys after T_O, etc.

Friday 31st January, - 2003

Jekyll site HydroCamelÔ deployment

The HydroCamel™ is a commercially manufactured submersible water sampler. The instrument can be programmed to take up to 20 1 litre seawater samples. In addition, the instrument will record turbidity (using a Seapoint™ optical backscatter sensor) and pressure. The user may prescribe the sampling frequency of these sensors. In this study data were collected in 10-second bursts at 5-minute intervals. The burst data were averaged and a single output value stored in the instrument memory. A turbidity threshold trigger can be set so that water samples are obtained when the ambient turbidity exceeds a prescribed value. The threshold must be exceeded for 12 consecutive 10 s burst periods (i.e. 12*5 min intervals=1 hour), before a water sample is taken. If the threshold turbidity trigger is not achieved, then a time-out sample is automatically taken every 24 hours.

The Hydrocamel™ was deployed twice at the Jekyll site (first at 31° 06.323N, 81° 22.564W, then at 31° 06.327N, 81° 22.595W) (Fig.1).

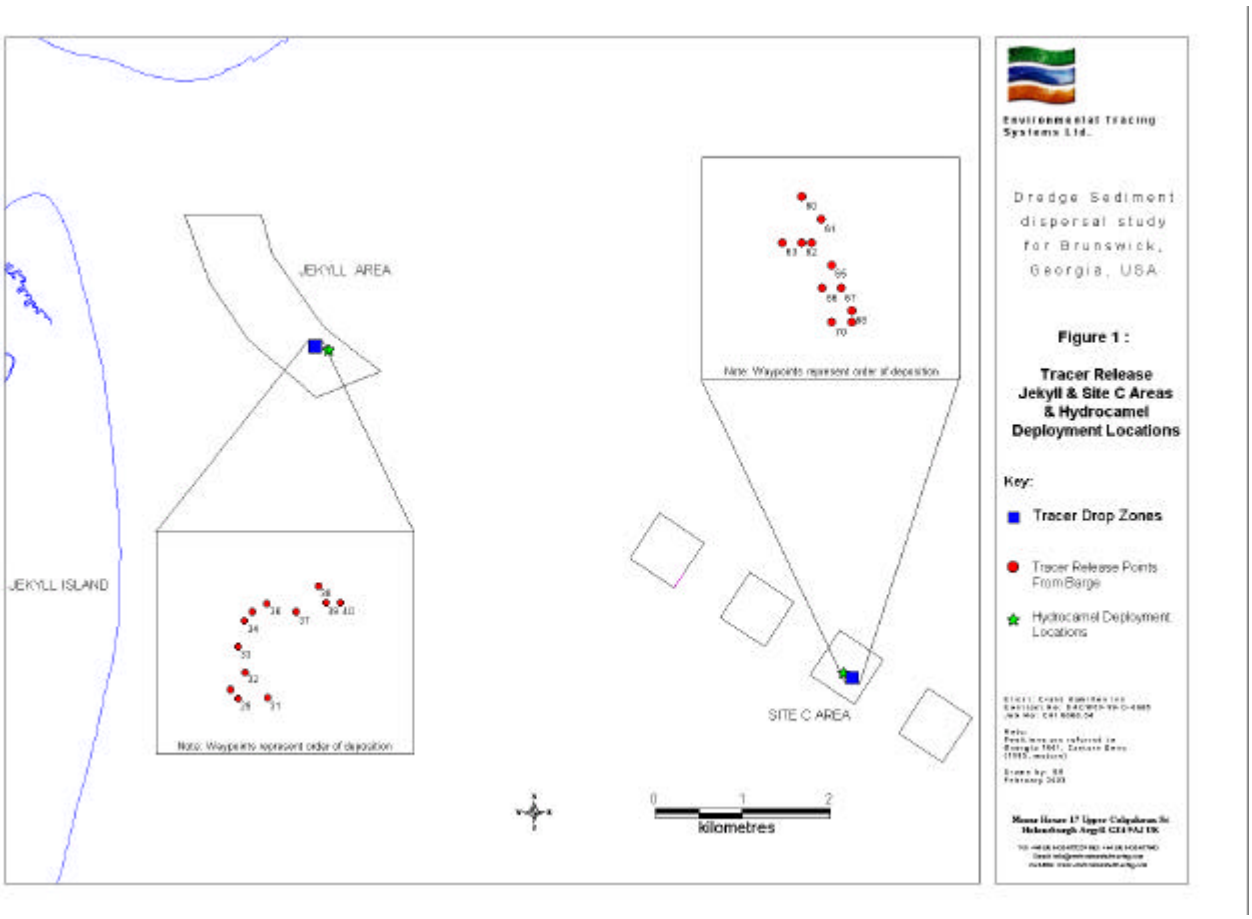


Figure 1. The positions of the barge during tracer release at the Jekyll and C sites. Waypoint numbers give the sequence order of the barge position. Also shown are the locations of the Hydrocamel™ deployments at each of the sites.

Jekyll site tracer release

Methodology

1000 kg of Magenta-sand (150-250 µm) and 500kg UV-blue-silt tracer (<100 µm) were pre-mixed with natural local sediment and deployed onto the seabed using specialised water-soluble bags supplied by Aquafilm, Worcestershire, England. Blocks of tracer-sediment mixture were initially broken into small granules and then scooped into a bag. The open end of the bag was then heat-sealed twice using a commercial heat-sealing gun. The bags were then passed to an individual standing level with the sea surface. This individual gently released the bag into the sea. The lifetime of these bags is 60-90 s following introduction of tracer-sediment mix.

The position of the barge was changed through time (after ~20 bag releases) to avoid the accumulation of bags on top of one another. The locations of the barge during the release are given in Table 1. A total of **219** bags were successfully released at the Jekyll inshore site.

Table 1. Location of the barge during tracer drop, Jekyll site

Waypoint No.	Latitude	Longitude	Time*
29	31°06.338	81°22.656	start
30	31°06.339	81°22.657	no time
31	31°06.338	81°22.652	15.25
32	31°06.341	81°22.655	15.50
33	31°06.344	81°22.656	16.21
34	31°06.347	81°22.655	16.47
35	31°06.348	81°22.654	17.25
36	31°06.349	81°22.652	17.57
37	31°06.348	81°22.648	18.30
38	31°06.351	81°22.645	19.00
39	31°06.349	81°22.644	19.30
40	31°06.349	81°22.642	End

*local time

Figure 1 shows the location of the barge during the tracer drops.

Saturday, 1st February, 2003

Jekyll site post-deployment sediment sampling

Following release of tracer into the sea, a sampling programme was devised to assess sediment dispersal from the drop zone. This is referred to as 'Jekyll T_0'. A radial sampling design was used, in which sediments were retrieved 100 m, 200 m and 500 m from the drop zone at each of the cardinal points. Samples were also collected along the major tidal axis (NW-SE) at these radii. A Smith-McIntyre sediment grab was used to retrieve seabed sediments. Three, randomly allocated 10 ml sub-samples were taken from each grab on the cardinal points, reducing to one sub-sample at each location on the tidal axis. The locations of the grab sampling points are given in Table 2 below.

Table 2. Co-ordinates of the grab sampling location, Jekyll T_0 survey

Waypoint No.	Latitude	Longitude
41	31°06.089	81°22.615
42	31°06.255	81°22.626
43	31°06.301	81°22.647
44	31°06.403	81°22.645
45	31°06.452	81°22.656
46	31°06.602	81°22.688
47	31°06.377	81°22.372
48	31°06.368	81°22.540
49	31°06.351	81°22.595
50	31°06.344	81°22.702
51	31°06.340	81°22.766
52	31°06.331	81°22.924
53	31°06.203	81°22.431
54	31°06.290	81°22.557
55	31°06.318	81°22.604
56	31°06.365	81°22.692
57	31°06.420	81°22.745
58	31°06.508	81°22.868

Figure 2 shows the T_0 sampling grid at the Jekyll site

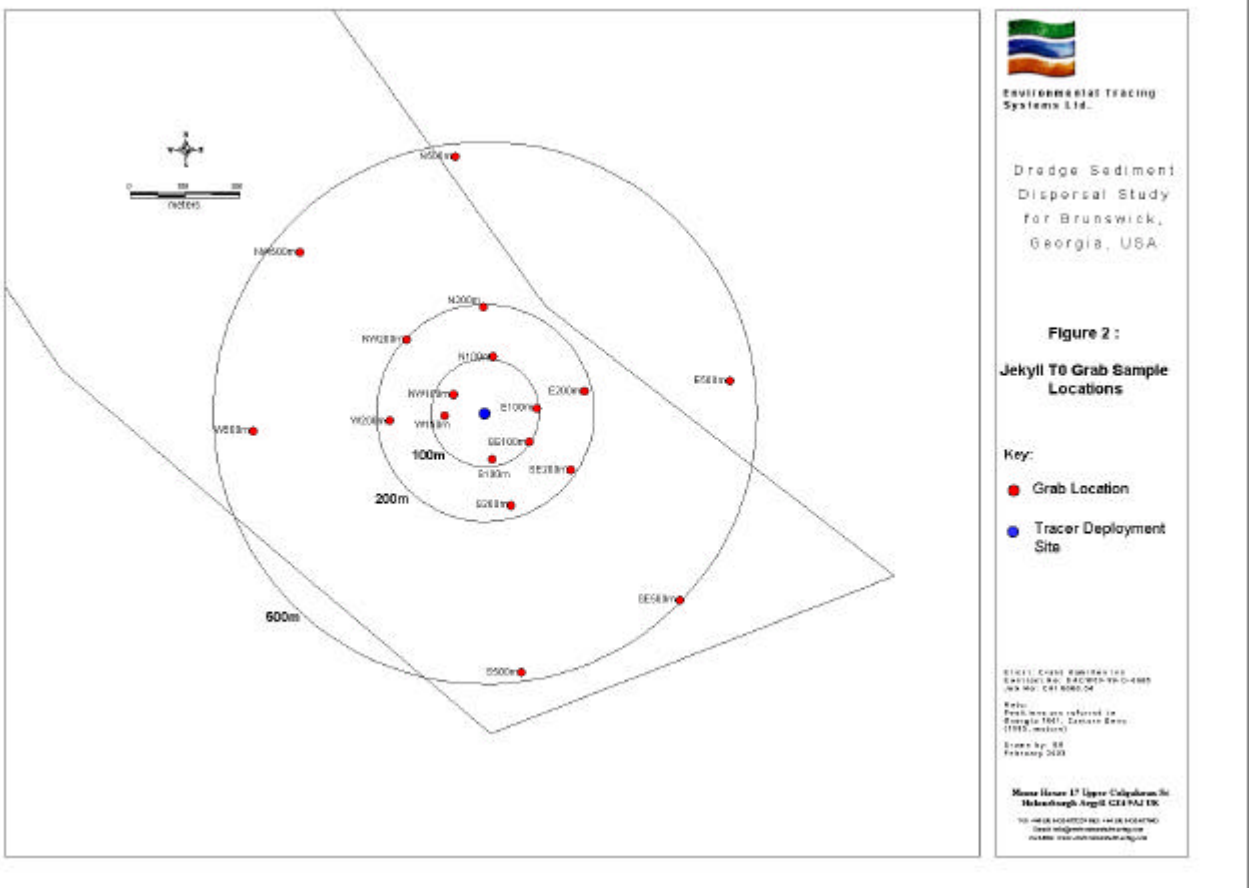
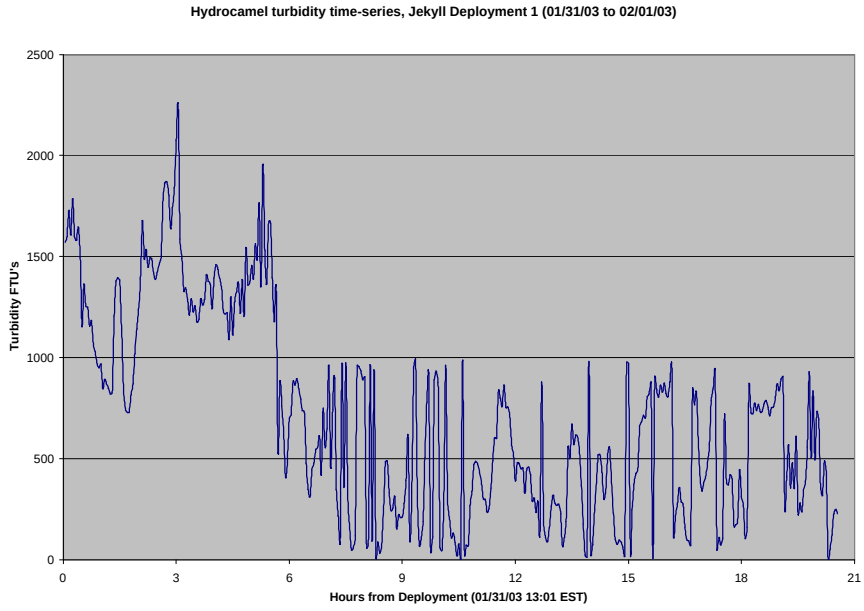


Figure 2 The T_0 sampling grid at the Jekyll site.

Recovery of Hydrocamel instrument

The Hydrocamel™ instrument was recovered from the Jekyll site at 13:00. 10 good water samples were recovered and transferred to 60 ml vials for fluorescence analysis. Turbidity and pressure data were downloaded, and these are shown in the Figure 3 below. The instrument was serviced and readied for subsequent deployments.

a)



b)

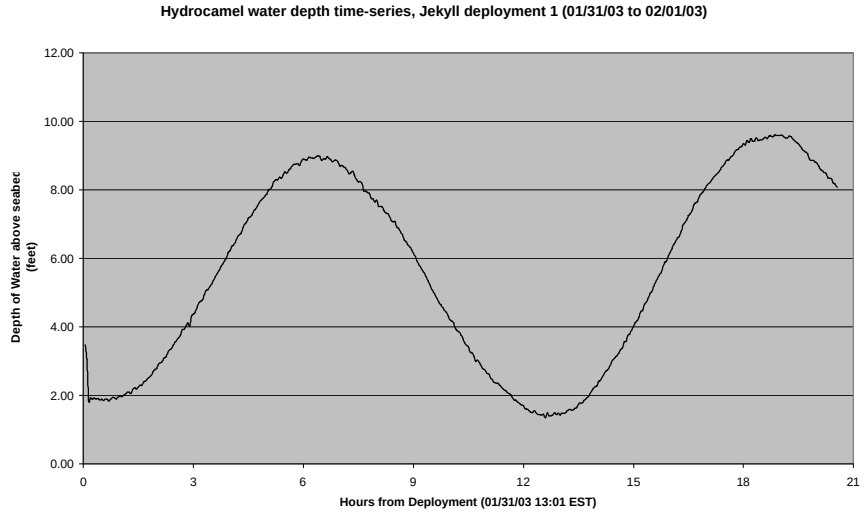


Figure 3. Time-series data of a) turbidity and b) water depth at the Jekyll site (01.31.03 – 02.01.03)

Sunday 2nd February, 2003

The Hydrocamel™ was re-deployed at the Jekyll site in the afternoon (~15:00). The location of this is shown in Figure 1, although scale effects show it to be in the same place from which it was recovered.

Wednesday 5th February

Site C tracer release

Violet-sand and yellow-silt tracer (of the same quantities and size fraction as per the Jekyll site) was released into the sea in precisely the same manner as described for the Jekyll site during 11.00-15.00 local time. The same quantity of tracer material was released using **181** bags. The locations of the barge during the release are given in Table 3.

Table 3 Location of the barge during tracer drop, Site C

Waypoint No.	Latitude	Longitude
60	31°04.252	81°18.791
61	31°04.250	81°18.789
62	31°04.248	81°18.791
63	31°04.248	81°18.793
64	31°04.248	81°18.790
65	31°04.246	81°18.788
66	31°04.244	81°18.789
67	31°04.244	81°18.787
68	31°04.242	81°18.786
69	31°04.241	81°18.786
70	31°04.241	81°18.788

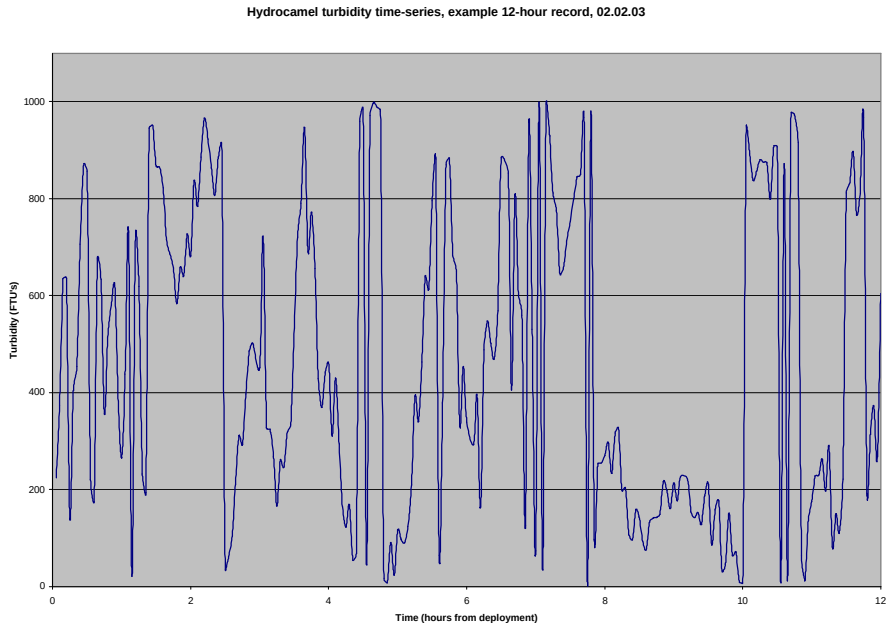
Figure 1 shows the positions of the barge during tracer release at Site C.

Thursday, 6th February, 2003

Recovery of the HydrocamelÔ

The Hydrocamel™ was recovered from the Jekyll site. 20 good water samples were recovered and transferred to 60 ml vials for fluorescence analysis. Turbidity and pressure data were downloaded, and these are shown in the Figure 4 below. The instrument was serviced and readied for subsequent deployment.

a)



b)

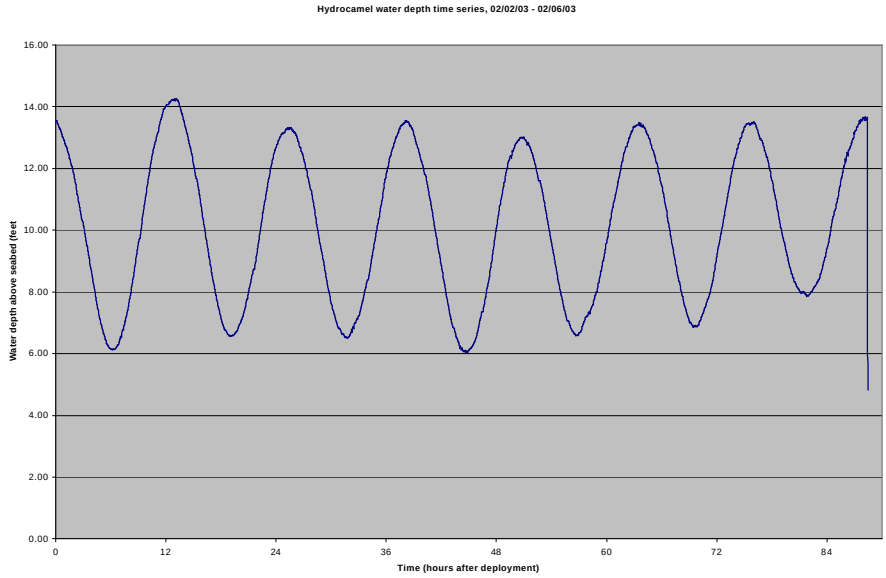


Figure 4. Time-series data of a) turbidity and b) water depth at the Jekyll site (02.02.03 – 02.06.03)

Friday, 7th February, 2003

Site C post-deployment sediment sampling

Following release of tracer into the sea, a sampling programme was devised to assess sediment dispersal around the drop zone. This is referred to as 'Site C T_0'. A radial sampling design was used as per the Jekyll site, in which sediments were retrieved 100 m, 200 m and 500 m from the drop zone at each of the cardinal points. Samples were also collected along the major tidal axis (NW-SE) at these radii. A Smith-McIntyre sediment grab was used to retrieve seabed sediments. Three, randomly allocated 10 ml sub-samples were taken from each grab on the cardinal points, reducing to one sub-sample at each location on the tidal axis. The locations of the grab sampling points are given in Table 4 below, and shown in Figure 5.

Table 4 Co-ordinates of the grab sampling location, Site C T_0 survey

Location	Latitude	Longitude
500N	31°04.505	81°18.790
200N	31°04.368	81°18.764
100N	31°04.315	81°18.795
100S	31°04.186	81°18.782
200S	31°04.153	81°18.793
500S	31°03.973	81°18.778
500SE	31°04.041	81°18.564
200SE	31°04.169	81°18.700
100SE	31°04.218	81°18.747
100NW	31°04.277	81°18.848
200NW	31°04.331	81°18.888
500NW	31°04.447	81°19.013
500W	31°04.250	81°19.112
200W	31°04.250	81°18.927
100W	31°04.255	81°18.855
100E	31°04.246	81°18.719
200E	31°04.243	81°18.667
500E	31°04.245	81°18.472

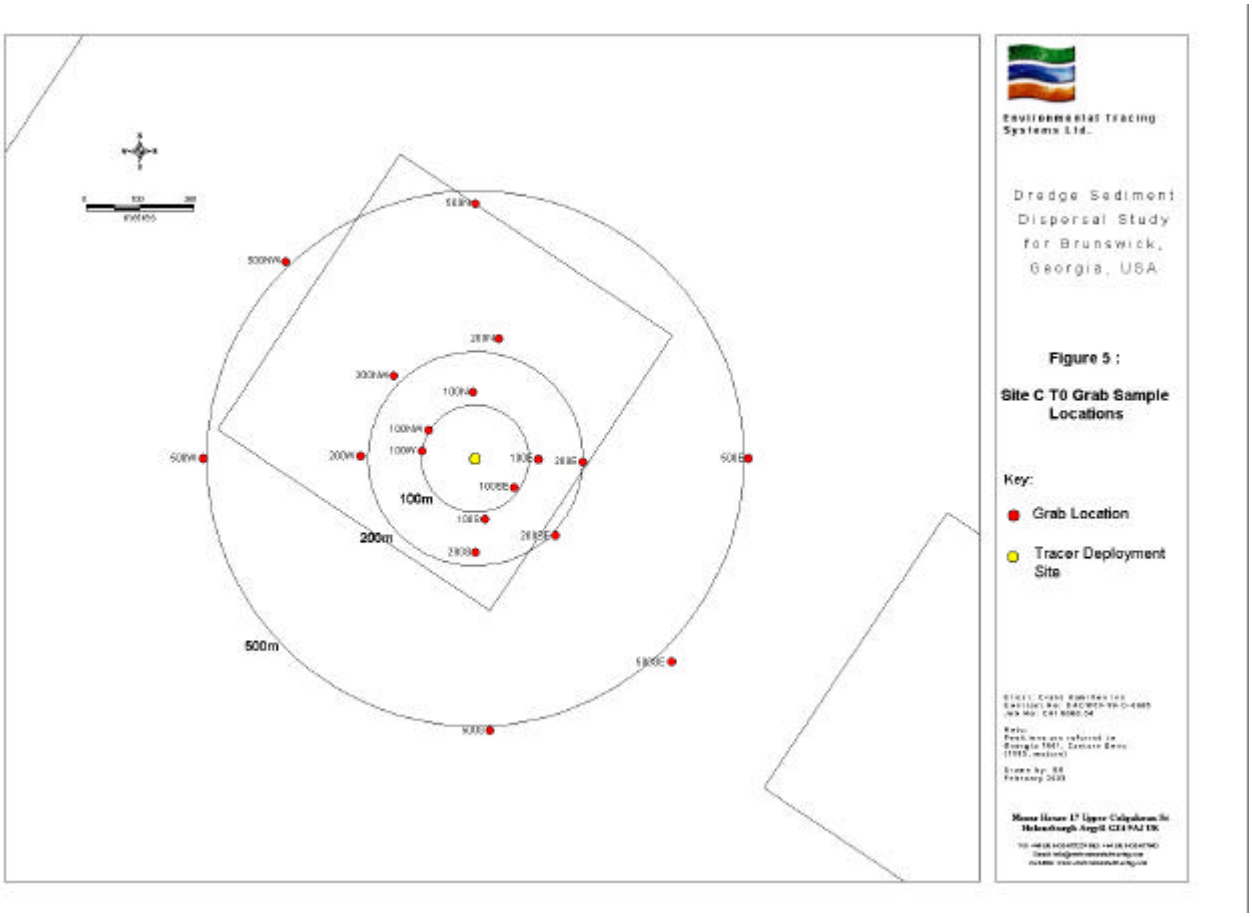


Figure 5 The T_0 sampling grid at Site C.

Hydrocamel™ deployment Site C

The Hydrocamel™ was re-deployed at Site C. The location of the instrument was 31° 04.291N, 81° 18.849W, and this is shown in Figure 1. The instrument was in the water by 17:38. The turbidity threshold trigger was set to 8000 FTUs, with a time out setting of 24 hours. The burst duration was 10 seconds.